ILLINOIS POWER COMPANY
Clinton Power Station

ASME Section XI Relief Request

RELIEF REQUEST 2014 (Revision 3)

COMPONENT INFORMATION

These testable check valves (1E12-F041 A/B/C, 1E21-F006, and 1E22-F005) provide isolation from the reactor coolant system and the emergency core cooling systems (Residual Heat Removal, Low Pressure Core Spray, High Pressure Core Spray). These valves are ASME Section III Code Class 1, Section XI Category A/C valves. Valves 1E12-F041 A,B, and C are 12" diameter and valves 1E21-F006 and 1E22-F005 are 10" diameter. All of these valves are non-slam check valves. One of these valves (1E12-F041A), which is typical of the group, is circled on the attached drawing.

CODE REQUIREMENTS

The ASME Code, Section XI, Subsection IWV-3520 requires that these valves be exercised every three (3) months unless such operation is not practical during plant operation. In this situation, the valves may be part-stroke exercised during plant operation and full-stroke exercised during cold shutdown.

RELIEF REQUEST/JUSTIFICATION

Exercising these valves on a three month frequency using the emergency core cooling system pumps to inject water into the reactor is not in the interest of plant safety, because this cooler water would create an undesirable power transient. In addition, neither the Low Pressure Core Spray nor Residual Heat Removal pumps are capable of opening their injection valves against full reactor pressure. Mechanically exercising these valves during reactor operation is not practical because they are located inside the drywell and access is restricted due to radiation conditions.

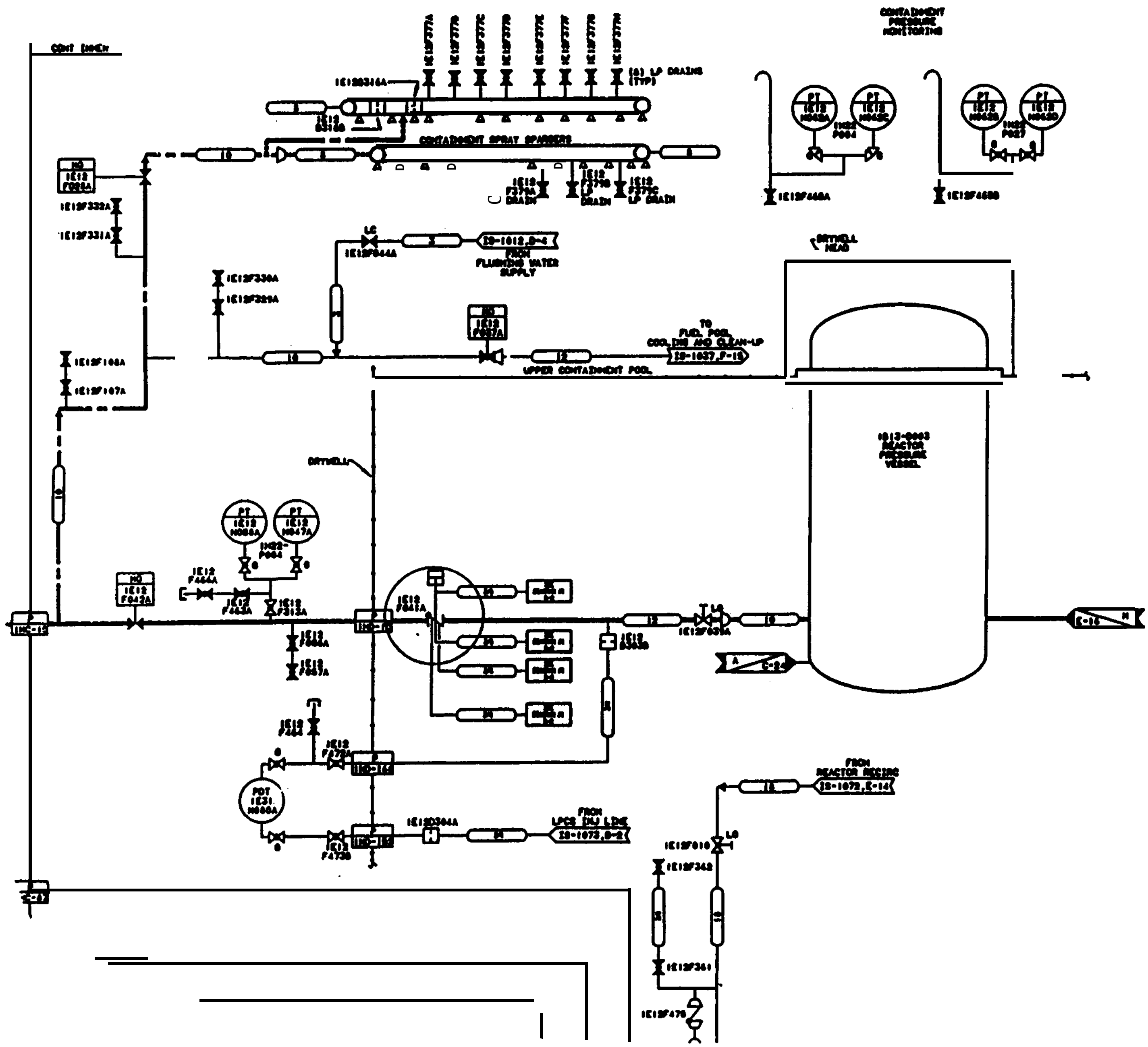
Mechanically exercising these valves on a cold shutdown frequency as allowed by the ASME Code is not practical because the air operator is not designed to perform a full stroke test. Although the air operator can be removed to perform the full stroke test, this is a significant maintenance activity and could interfere with work which is necessary to restore the plant to service. This would create an unreasonable hardship for Illinois Power Company.

Using pump pressure to exercise these valves during cold shutdown is also not in the interest of plant safety. Although temperature could be matched fairly closely between the injection source (emergency core cooling systems) and the reactor, a minor thermal mismatch between these temperatures creates an undesirable effect on the fatigue life of the reactor nozzles.

In addition, the injection lines associated with the residual heat removal system nozzles are not equipped with internal spargers. General Electric Service Information Letter 401 identifies problems in injecting water through this flow path and the potential damage to nuclear instrumentation or fuel assemblies which could occur if this flow path were used for other than emergency conditions.

ALTERNATE TESTING PROPOSED

Illinois Power Company will full stroke exercise the valves during refueling by measuring the torque required to lift the disc and then move the disc through a full stroke.


CONTAINMENT SPRAY SPARGERS
CONTAINMENT PRESSURE MONITORING
UPPER CONTAINMENT POOL
DRYWELL
DRYWELL HEAD
REACTOR PRESSURE VESSEL
FROM FLUSHING WATER SUPPLY
FROM REACTOR RECIRC
FROM LPCS INJ LINE

RELIEF REQUEST **PR-12**

Third Ten-Year Interval 1ST Program Revision 3

System: Service Water

Components: Service water pumps **PSWO-1A/B/C/D**

Component Function: Cooling for safety-related coolers following design basis accident; ultimate heat sink.

Code Requirements: IWP-4110 and **IWP-4120** for **flowrate** instrumentation accuracy and full-scale range.

Description of Relief:

Previously, the service water pump testing for pumps **PSWO-1A,-1B,-1C,** and -**1D,** was conducted at a flow rate approximately one-half accident flow rate in order to utilize flow instrumentation installed to measure service water flow through containment recirculation fan coolers. In response to a recommendation made by NRC during the team inspection of the service water system, November/December 1991, a new test methodology is proposed in **PR-12.** This effectively eliminates the need for Relief Request **PR-7,** and it is withdrawn upon NRC approval of **PR-12.** The new test method is expected to be implemented in the tests scheduled for November 1992.

The new test method will also provide full flow exercising of the service water pump discharge check valves 4601, 4602, 4603, and 4604. This will eliminate the need for employing **a** disassembly and inspection program for these four valves discussed in Relief Request **VR-17,** and it is withdrawn upon NRC approval of **PR-12.** The change also permits reclassification of twelve manual butterfly valves which function as the inlet and outlet valves for the four containment recirculation fan coolers and the two reactor compartment coolers from “Category A - Active” to “Category A - Passive.” The appropriate changes to the 1ST Program for these valves will be made. These changes do not effect existing or new relief requests.

Basis for Relief:

The present system configuration and iristrumentation does not provide permanently installed flow indication at the SW [service water] pump discharge piping to provide a positive means of determining full flow during pump tests. Employing a clamp-on ultrasonic **flowmeter** to measure full SW pump discharge flow is not currently addressed in ASME Section XI, Subsection **IWP** (Code).

The Code requires an instrument accuracy of 2% of full scale. The clamp-on ultrasonic **flowmeter** possesses an instrument accuracy of 3% of actual flow. Although the percentage error (3% of the actual flow as compared with 2% of

full scale) is stated as a **larger** numerical value, the actual absolute value **of** instrument inaccuracy at the reference flow rate of 5,600 gpm (approximate **SW pump design [flow rate])** is actually less for the clamp-on ultrasonic **flowmeter. The accuracy of** the reading from a 1 - 10,000 gpm analog gauge is **5,600 ± 200 gpm** (2% of full scale). The accuracy of the reading from the clamp-on ultrasonic **flowmeter** is 5,600 ± 168 gpm (3% of actual flow). Thus the actual maximum instrument error of the flow reading, as read on the **clamp-**on ultrasonic **flowmeter,** is less than the error as read on the analog gauge at the specified flow rate of 5,600 gpm.

The full-scale range (calibrated) of the clamp-on ultrasonic **flowmeter** is 40 ft./see. This corresponds to a flow rate of approximately 17,000 gpm (for 14 inch pipe), which exceeds three times the reference value of 5,600 gpm.

Relief is requested to utilize a digital flowrate instrument for **inservice** testing of the service water pumps. Relief is required because the accuracy of the measurement will not be ± 2% over the calibrated range as required by **OM-6,** Table 1, Note (l). The accuracy will be **± 3%** over the calibrated range (percent of reading) based on the piping configuration and the location for placement of the instrument. However, the accuracy achieved is more accurate than would be achieved with analog instrumentation which **is required to be ±** 2% of full scale (no more than three time reference value).

The digital clamp-on ultrasonic flowmeter yields a more accurate flow reading at the specified SW pump test flow rate of 5,600 gpm than an analog instrument and the range of the clamp-on ultrasonic **flowmeter** meets the requirement of **ASME/ANSI OMa-1988,** Part 6, Paragraph **4.6.1.2(b),** i.e. reference flow rate **<** 70% of calibrated range. Repeatability of the digital readings will be assured **by** permanently mounting the instrument. With a ± 3% of reading accuracy, the digital reading will be in the range of 5432 gpm to 5712 gpm. An analog instrument with **a ±** 2% accuracy and a range of three time the reference would provide a reading in the range of ± 336 gpm (5264 gpm to 5936 gpm). In order to meet the accuracy requirements of **OM-6** for digital instrumentation, modifications to the piping would be required in order to place the clamp-on **flowmeter** in a location five pipe diameters from an elbow. Similar modifications would be required to install permanent flow measurement analog instrumentation which would even then not provide a reading as accurate as will be achieved with the clamp-on **flowmeter.** Compliance with **OM-6** would be a hardship without a compensating increase in the level of quality and safety, with the hardship being the modifications that would be required, with the accuracy of the reading not being increased.

This substantial improvement in test method provides for the measurement of a sufficiently accurate and repeatable value for SW pump flow rate. By employing this test method and obtaining the pump's corresponding differential pressure, the hydraulic performance of the SW pump can be more accurately assessed. Repeatability of flow rate measurement will be ensured through the, permanent installation of clamp-on ultrasonic **flowmeter** instrumentation via the [XXX] Station minor modification process.

Alternative Testing

SW pump flow testing will utilize a permanently installed clamp-on ultrasonic **flowmeter** to allow rate measurement at a reference flow equivalent to the design point of the SW pumps.

RELIEF REQUEST NO. V2

SYSTEM Component Cooling Water

VALVE NUMBERS 1CC-1079/1080 1CC-1081/1082
2CC-1091/1092 2CC-1093/1094

CATEGORY A/C, C

CLASS 3

FUNCTION These check valves form the boundary between the non-safety Instrument Air or Nitrogen supply systems and the safety-grade accumulator and receiver tanks. The tanks provide an emergency air or nitrogen supply to certain safety-related components. The check valves are required to close upon failure of the air or nitrogen supply system in order to contain the compressed gas in the tanks.

TEST REQUIREMENT OM Part 10, para 4.3.2, "Exercising Tests for Check Valves"

BASIS FOR RELIEF Each valve listed is one of two check valves in series at the inlet to a safety-grade accumulator or receiver tank. In each case, only one check valve is required in order to meet the safety class interface criteria of ANSI N18.2a-1975. However, two check valves are provided for added reliability, not for redundancy. The safety-related components served by the accumulator and receiver tanks are redundant to other similar components which have their own dedicated safety-grade air supplies. As long as one of the check valves in the pair is capable of closure, then the safety analysis assumptions for the check valves are met. Some of the check valve pairs do not have provisions for testing each valve individually. However, the closure capability of each pair of check valves can be verified.

SUBSTITUTE TEST

Each pair of series check valves will be exercise tested at the required frequency by some positive means to verify the closure capability of at least one of the valves. No additional exercise testing will be performed unless there is an indication that the closure capability of the pair of valves is questionable. In that case, both valves will be declared inoperable and not returned to service until they are either repaired or replaced.

DRAWINGS: M-2236, SAR Figure 9.2.6-4

REFERENCES: ANSI N18.2a-1975

RELIEF REQUEST VR-13

Valve Numbers:

1DG5182A,B	2DG5182A,B
1DG5183A,B	2DG5183A,B
1DG5184A,B	2DG5184A,B
1DG5185A,B	2DG5185A,B

Number of Items: 16

ASME Code Category: B & C

ASME Code Section XI Requirements:

These valves are not within the scope ofASME Code, Section XI, Subsection IWV requirements. However, the requirements for stroke timing and trending of the valves associated with the Diesel Air Start System are being included as augmented components for inservice testing. These valves associated with the Diesel Air Start System shall be exercised to the position required to fulfill their function during plant operation per IWV-3412 and IWV-3522. Additionally, the stroke testing of power operated valves shall be measured to the nearest second and such stroke times trended to document continued valve operational readiness per IWV-3413 (b) and IWV-3417.

Basis for Relief:

The monthly Diesel Generator testing program, outlined in XXXX Station Technical Specifications and implemented by station operating procedures, exceeds the intent of the quarterly valve testing program which would be required by ASME Code, Section XI. Additionally, the stroke timing of solenoid operated valves associated with the Diesel Air Start System is impractical due to the fast actuation of these valves.

Alternative Testing:

The performance ofXXX Station's Diesel Generator operability monthly surveillance will verify the operational readiness of the valves associated with the Diesel Air Start System. This surveillance testing will require the recording of the air pressures contained in both trains

RELIEF REQUEST VR-13
(continued)

A & B of the Diesel Generator Air Start Receiver Tanks both before and immediately after diesel generator start. By the comparison of these valves between trains, the satisfactory operation of the power operated and self-actuated check valves associated with the Diesel Air Start System can be adequately demonstrated. On an alternating basis, a portion of the air start system will be isolated and repressurized prior to diesel start. This will allow verification that the air start system check valves in the unisolated portion stroke open.

RELIEF REQUEST NUMBER GR-4

System: Various

Valve: Various

Category: A, B

C l - Various

Function: Various

Impractical Teat **Requirements:** WV-3413; Power Operated Valves Corrective Action, WV-341 7; Corrective Action

Basis for Relief: Generic Letter 89-04 Position 6 recognizes that measuring changes in stroke times from a reference value as opposed to measuring changes from the previous test is a better way to detect valve degradation. Generic Letter 89-04 Position 5 and OMa- 1988, Part 10 provide NRC approved methodology for establishing a stroke time reference value, an acceptable stroke time band, and a limiting stroke time value. The alternative testing is in accordance with this methodology.

Alternative Testing: The power operated valve testing will be performed in accordance with OMa-1 988, Part 10, paragraphs 4.2.1.4, 4.2.1.8, and 4.2.1.9. The acceptable band and Limiting Stroke Time (LST) will be determined as follows (RV time in Sec):

Operator Type	Ref. Value	Acc. Band	LST
Motor	RV > 10	0.85RV - 1.15RV	1.3RV
	2 ≤ RV ≤ 10	0.75RV - 1.25RV	1.5RV
Other	RV > 10	0.75RV - 1.25RV	1.5RV
	2 ≤ RV ≤ 10	0.50RV - 1.50RV	2.0RV
All	RV < 2	≤ 2	2

In addition, if a more restrictive value of stroke time exists in the Technical Specifications or the Updated Safety Analysis Report, it will be used as the LST instead of the value calculated above.

Approval: Relief granted with provisions in SER dated September 24, 1992.

RELIEF REQUEST NO. RP-8

System: Standby Service Water

Pumps:

Pump	Code Class	P & I D Dwg. Number
SW-P-1A	3	M524, SH 1
SW-P-1B	3	M524, SH 2
HPCS-P-2	3	M524, SH 1

Section XI Code Requirements For Which Relief is Requested:

IWP-3100 requires that the system resistance be varied until either the measured differential pressure or measured flow rate equals the corresponding reference value. The quantities of Table IWP-3100-1 are then measured or observed and compared to the corresponding reference value.

Basis for Relief:

1. Service Water systems are designed such that the total pump flow cannot be adjusted to one finite value for the purpose of testing without adversely affecting the system flow balance and Technical Specification operability requirements. Thus these pumps must be tested in a manner that the service water loop remains properly flow balanced during and after the testing and each supplied load remains fully operable per Technical Specifications to maintain the required level of plant safety during power operation.

2. The service water system loops are not designed with a full flow test line with a single throttle valve. Thus the flow cannot be throttled to a fixed reference value every time. Total pump flow rate can only be measured using the total system flow indication installed on the common return header. There are no valves in any of the loops, either on the common supply or return lines, available for the purpose of throttling total system flow. Only the flows of the served components can be individually throttled. Each main loop of service water supplies 17-18 safety related loads, all piped in parallel with each other. The HPCS-P-2 pump loop supplies four loads, each in parallel. Each pump is completely independent from the others (no loads are common between the pumps). Each load is throttled to a FSAR required flow range which must be satisfied for

Relief Request RP-8 (Continued)

the load to be operable. All loads are aligned in parallel, and all receive service water flow when the associated service water pump is running, regardless of whether the served component itself is in service. During power operation, all loops of service water are required to be operable per Technical Specifications. A loop of service water cannot be taken out of service for testing without entering an Action Statement for a Limiting Condition for Operation (LCO). Individual component flows outside of the FSAR mandated flow ranges also *induce* their own Technical Specification action statements that in turn can induce full plant shutdown in as little as two hours, depending on the load in question.

c. Each loop of service water is flow balanced before exiting each annual refueling outage to ensure that all loads are adequately supplied. A flow range is specified for each load to balance all the flows against each other. *Once* properly flow balanced, very little flow adjustment can be made for any one particular load without adversely impacting the operability of the remaining loads (increasing flow for one load reduces flow for all the others). Each time the system is flow balanced, proper individual component flows are produced, but this in turn does not necessarily result in one specific value for total flow. Because each load has an acceptable flow range, overall system full flow (the sum of the individual loads) also has a range. Total system flow can conceivably be in the ranges of 9247 - 10,079 GPM for SW-P-1A pump, 9212 - 10,043 GPM for SW-P-1B pump, and 1050 - 1158 GPM for HPCS-P-2 pump. Consequently, the desire to quarterly adjust *service water* loop flow to one specific flow value for the performance of inservice testing conflicts with system design and component operability requirements (i.e. flow balance) as required by Technical Specifications.

Alternate Testing to be Performed:

As discussed above in the basis for relief section, it is extremely difficult or impossible to return to a specific value of flow rate or differential pressure for testing of these pumps. Multiple reference points could be established according to the Code, but it would be impossible to obtain reference values at *every* possible point, even over a small range. An alternate to testing requirements of IWP-3100 *is to* base the acceptance criteria on a reference curve. Flow rate and discharge pressure are measured during inservice testing *in* the as found condition and compared *to an* established reference curve. Discharge pressure instead of

Relief Request RP-8 (Continued)

differential pressure is used to determine pump operational readiness as allowed by Relief Request RP-3 (Relief granted per SER/TER Reference 2.3.1, dated May 7, 1991). The following elements are used in developing and implementing the reference pump curves.

1. A reference pump curve (flow rate vs discharge pressure) has been established for SW-P-lA and SW-P-1B from data taken on these pumps when they were known to be operating acceptably. These pump curves represent pump performance almost identical to preoperational test data. The methodology employed for establishing a reference pump curve is similar to that for performing a comprehensive test being proposed by the OM Code Committee.

2. Pump curves are based on seven or more test points beyond the flat portion of the *curve (at* flow rate greater than 4800 gpm). Rated capacity of these pumps is 12,000 gpm. Three or more test data points were at flow rate greater than 9,000 gpm. The pumps are being tested at full design flow rate.

3. To reduce the uncertainty associated with the pump curves and the adequacy of the acceptance criteria, special test gauges (±0.5% full scale accuracy) were installed to take test data in addition to plant installed gauges and Transient Data Acquisition System (TDAS) . All instruments used either met or exceeded the Code required accuracy.

4. *For* HPCS-P-2 pump, the reference pump curve is based *on* the manufacturer's pump curve which was validated during the preoperational testing.

5. Review of the pump hydraulic data trend plots indicates close correlation with the established pump reference curves, thus further validating the accuracy and adequacy of the pump curves to assess pumps operational readiness.

6. The reference pump curves are based on flow rate vs discharge pressure. Acceptance criteria curves are based on differential pressure limits given in Table IWP-31OO-2. Setting the Code Acceptance Criteria on discharge pressure using differential limits is slightly more conservative for these pump installations with suction lift (Relief Request RP-3, SER/TER Reference 2.3.1, dated May 7, 1991). See the attached sample SW-P-1A pump Acceptance Criteria sheet. Area 1-2-3-4 is the acceptable range for pump performance. Areas outside 1-2-3-4 but within 5-6-7-8 define the Alert Range, and the areas outside 5-6-7-8 define the

Relief Request RP-8 (Continued)

required Action Range. These acceptance criteria limits do not conflict with Technical Specifications or Final Safety Analysis Report operability criteria.

7. Only a smell portion of the ●stablished reference curve is being used to accommodate flow rate variance due to flow balancing of various system loads.

8. Review of vibration data trend plots indicates that the change in vibration readings over the narrow range of pump curves being used is insignificant and thus only one fixed reference value has been assigned for each vibration location.

9. After any maintenance or repair that may affect the existing reference pump curve, a new reference pump curve shall be determined or the existing pump curve revalidated by an inservice test. New reference pump curve shall be established based on at least 5 points beyond the flat portion of the pump curve.

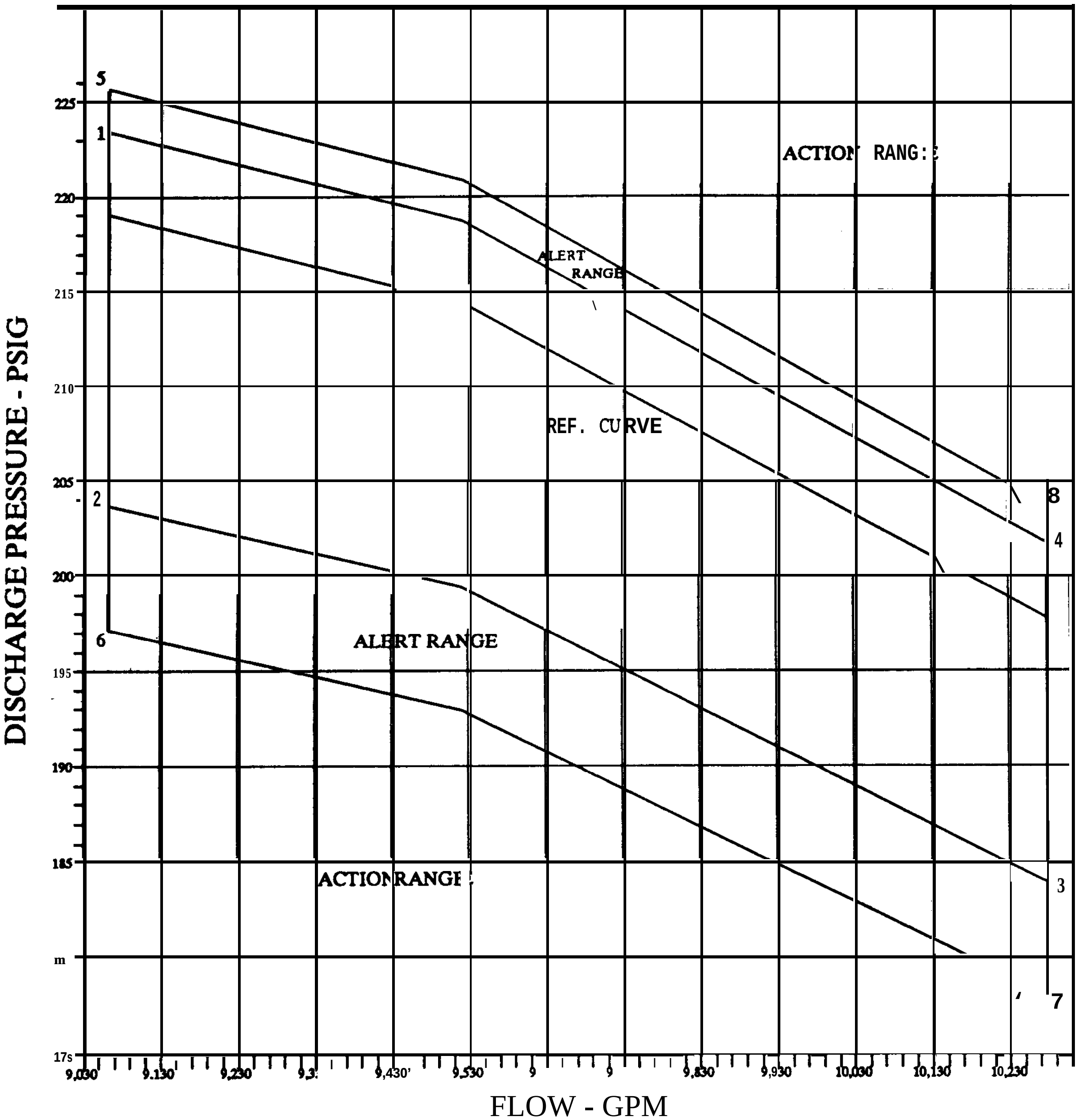
Quality/Safety Impact:

Design of WNP-2 Service Water System and the Technical Specifications requirements make it impractical to adjust system flow to a fixed reference value for inservice testing without adversely affecting the system flow balance and Technical Specification operability requirements. Proposed alternate testing using a reference pump curve for each pump provides adequate assurance and accuracy in monitoring pump condition to assess pump operational readiness and shall adequately detect pump degradation. Alternate testing will have no adverse impact on plant and public safety.

Relief Request RP-8 (Continued)

SAMPLE DATA SHEET

SW-P-1A ACCEPTANCE CRITERIA



ALERT RANGE - Area Outside 1-2-3-4

ACTION RANGE - Aera Outside 5-6-7-8